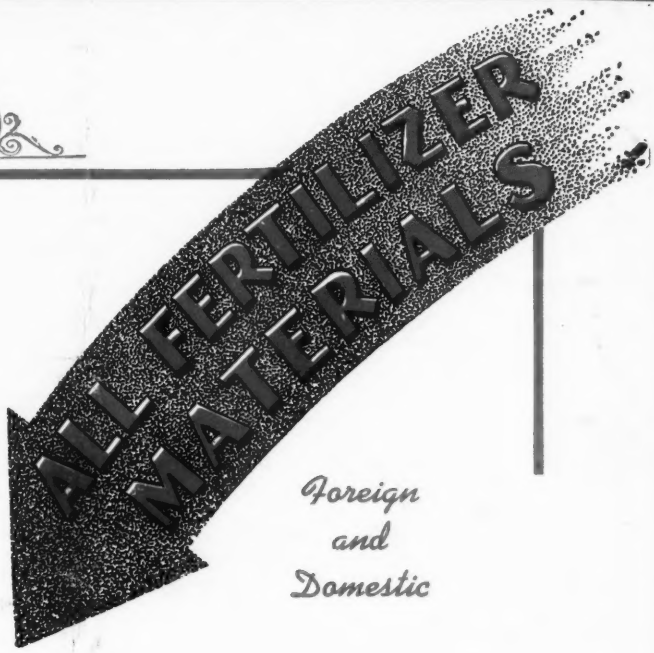
Vol. 108, No. 8 April 17, 1948

The American FERTILIZER



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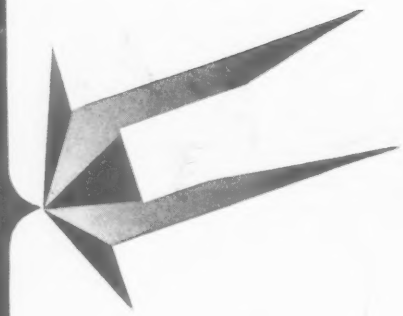

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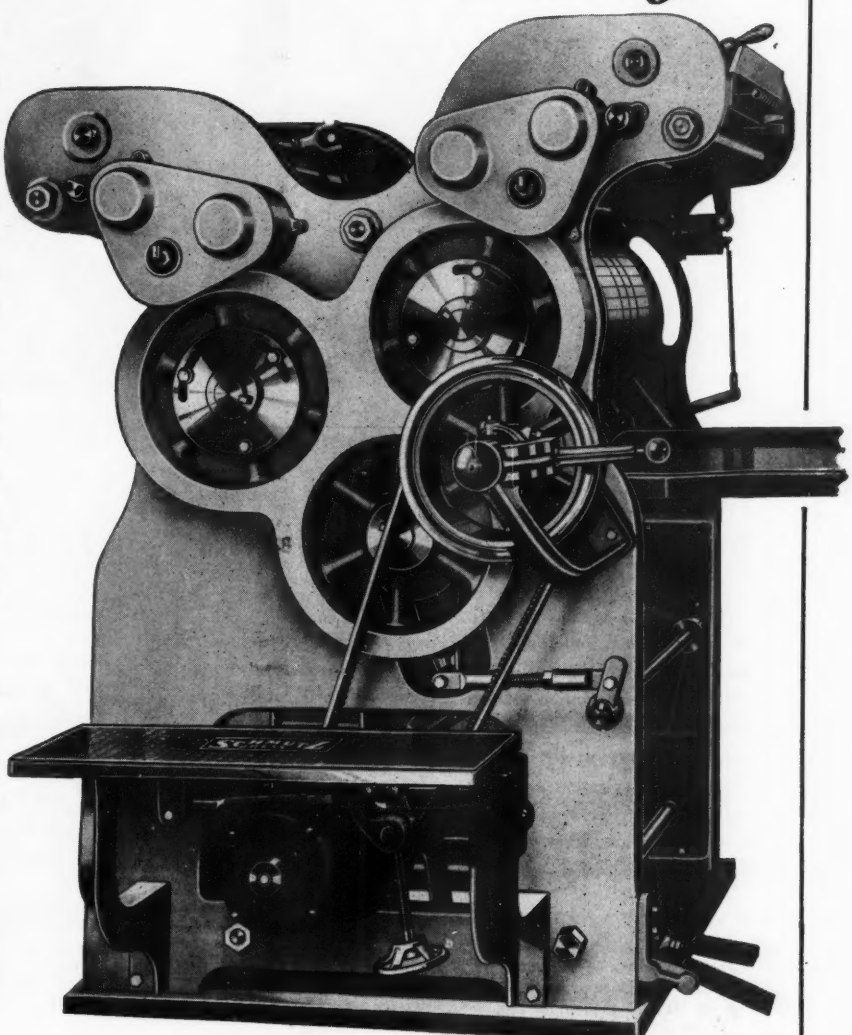

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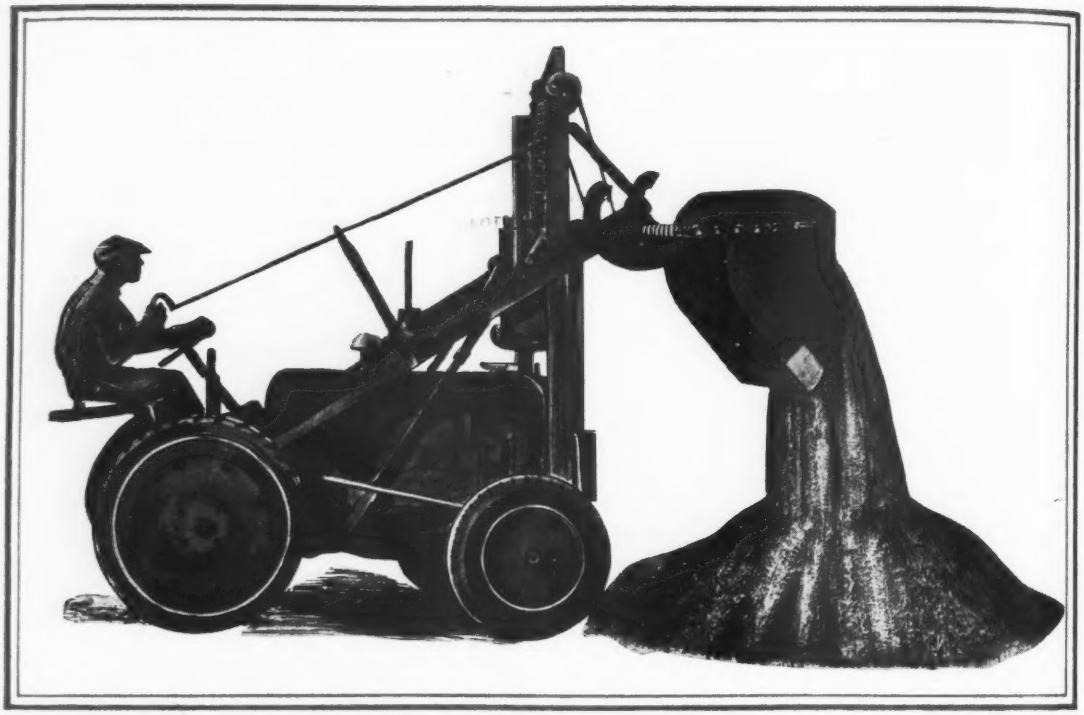

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The American FERTILIZER

Vol. 108 APRIL 17, 1948 No. 8

What Happens to the Urine Nitrogen When Using Superphosphate in the Gutters?

By OLLE FRANCK

Agricultural Experiment Station, Stockholm, Sweden

The nitrogen content of solid manure is contained in difficultly soluble and non-volatile organic compounds. For this reason there is no difficulty in preserving the nitrogen content of the manure during its transportation from the barn to the fields. The situation in connection with the urine nitrogen, however, is different. This contains easily soluble and even volatile organic compounds. In the case of cattle, on normal feed, most of the nitrogen is in the form of easily soluble organic compounds and only a very minor quantity is in the form of volatile ammonia. When large quantities of silage are used, it may happen that a substantial portion of the nitrogen is present in the form of ammonia. In general, however, it can be assumed that the major portion of the nitrogen in the urine is non-volatile.

Bacteria are always present in a barn and these bacteria have the ability to change the organic nitrogen compounds into ammonia. This ammonia formation is facilitated when straw is used for bedding. However, ammonia is not formed when the urine is immediately mixed with a sufficient quantity of superphosphate. This can be done by spreading superphosphate in the gutter in a quantity of at least one pound per animal per day. We do not know exactly what prevents the ammonia formation, that is, whether it is due to the bactericidal property of superphosphate itself or whether the acid reaction of the mixture inhibits the bacterial activity. In either case, the superphosphate is directly responsible for the net result. Initially the urine is strongly basic, having a pH value of over 8 because it contains excess of carbonates, primarily of soda and potash. When mixed with superphosphate, a strong evolution of carbon dioxide occurs and the pH value is lowered. Broadly speaking, nothing else happens. The result of recently made experiments proves this point. (See Table I.)

In the tests described in Table I both the total nitrogen content as well as the ammonia

TABLE I

	Tot. N t.	Am. Nit.	pH
Fresh urine 100 c.c. + toluol	0.63	.11	8.3
Fresh urine 100 c.c. + superphosphate 10 g.	0.62	0.11	6.2
Fresh urine 100 c.c. + superphosphate 10 g. + toluol*	0.63	0.12	5.7
Fresh urine 100 c.c. + superphosphate 10 g. + toluol* + ymp**	0.62	0.11	5.8
Fresh urine 100 c.c. + superphosphate 10 g. + ymp**	0.63	0.11	6.1

* For sterilization.

** Ymp. equals inoculation with insignificant amount of straw and solid manure.

[1] From Växt-näring-Nytt, Vol. 3, No. 3, 1947.

[2] State Agronomist Agric. Expt. Station, Stockholm, Sweden. Translated by M. Shoeld, The Davison Chemical Corporation, Baltimore, Maryland.

nitrogen were the same in all of the samples. The percentage of ammonia nitrogen was insignificant. The reaction had changed from strongly basic to acid and no ammonia formation had taken place. The carbon dioxide had been driven off and the pH value had changed to the acid side.

According to information from the United States of America superphosphate in water suspension reacts with ammonia in such a manner that the monocalcium phosphate is changed to tricalcium phosphate (insoluble in pure water but relatively soluble in water containing carbon dioxide and the ammonia forms ammonium sulphate. This reaction has clearly no practical significance in this case when superphosphate is used in the gutter, unless the urine contains a substantial quantity of ammonia. The following investigation throws further light on the subject.

After cleaning out the manure in the morning, about one pound of superphosphate per animal was spread in the gutter (a total of 2.2 pounds per animal per day, the same quantity as was used in the experiments with the urine ammonia) and chopped straw to the extent of 13.2 pounds per animal per day. During the evening clean-out, two samples were taken of the manure (solid manure plus urine, plus straw, plus superphosphate) and one of the samples was sterilized by dousing it with toluol. The samples were kept in sealed cans. These samples were analyzed after having been kept for seven days at normal room temperature. When the covers were taken off, there was no smell of ammonia and the analytical results given below support this contention.

Manure only: 0.47% total nitrogen of which 0.09% is ammonia nitrogen
Manure plus toluol: 0.41% total nitrogen of which 0.98% is ammonia nitrogen

It has been claimed that bacteria which produce ammonia will after some time become acclimatized to superphosphate and the value of the superphosphate as a material for conservation and sterilization would thereby be nullified. In this particular case (Halsnäs) superphosphate has been used for three years and spread regularly in the gutters but so far there has been no apparent so-called acclimatization of the bacteria.

Summarizing what happens to the urine when superphosphate is spread in the gutters, we can state that carbon dioxide is eliminated, the urine is changed so as to cause an acid reaction. The nitrogen compound apparently does not undergo any change and, therefore, loss of nitrogen due to ammonia volatilization does not take place.

New Device Speeds Up Hand Trucking Operations

A new device, known as the Universal Tilt Truck Attachment, has been placed on the market by the Melooz Manufacturing Company, 4730 Avalon Boulevard, Los Angeles, California. This attachment is a rigid, adjustable support for 2-wheeled hand trucks which allows any standard truck (except aluminum trucks) to be converted into a perfectly balanced 3-wheeled truck which carries the entire load of the article being moved. Through its use, the standard hand truck is transformed into a modern, efficient piece of material-handling equipment.

Universal Tilt Truck Attachment Handling Eight Bags of Cereals with Minimum Effort

A telescoping tube, extending upward from the platform to the top crosspiece of the truck, is adjustable by finger-tip control so that the truck can be tilted and locked at any angle desired. The unique leverage plate extends over the third wheel, bringing the trucker away from, and out from under the load when breaking, preventing injuries. Further, the principle of leverage is utilized to multiply the strength of the trucker, so that one man can handle a load which normally would require two men to handle.

The use of the Universal Tilt Truck Attachment removes all strain from the trucker. He cannot lose his balance even when the truck strikes an obstruction, or when working on wet and slippery floors, eliminating one of the major causes of load damage through tipping, and personal injury. The third wheel provides free steering in any direction. The trucker carries no weight but merely pushes or pulls the load to its destination.

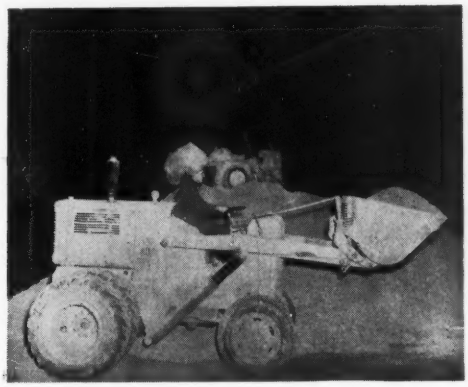
Hough Demonstrates Economies in Material Handling

In these days of steadily increasing labor costs, the problem of handling materials economically is taking more and more of the fertilizer plant manager's thought and time. The old method of plentiful manpower and hand carts, which used to be the accepted practice in all but the largest plants, simply has to go into the discard if the manufacturer is to keep prices of his finished product within competitive levels. The fertilizer industry today enjoys the distinction of giving the farmer more for his dollar than is the case with any other product he buys. This has been possible only by taking advantage of every possible economy in the manufacturing process.

A 60-ton boxcar at Price Chemical Company, Louisville, Kentucky, is unloaded in an average of two hours with a Payloader. Because of its 78-inch turning radius, it can be maneuvered in and out of cars at a high rate of speed

With this thought in mind, the Frank G. Hough Company, of Libertyville, Illinois, producers of motorized Payloader shovels, has recently made a survey of results obtained in several midwestern fertilizer plants.

For many years, the North American Chemical Company, Louisville, Kentucky, handled the ingredients of their commercial fertilizer with man power and "Georgia Buggies," but when Superintendent Tom Bowser saw a Hough Model HA Payloader in operation at another plant in that city, he immediately decided the time had come for mechanizing the steps in his production that had always necessitated hundreds of man hours. At the plant where Mr. Bowser saw his first Payloader, they now have five. Two of them working on a 50 ton box car, that formerly took 9 men 4½ hours to unload—40 man hours—now empty the car in 1½ hours. When he was told that it now costs this company 8 cents a ton to handle their material on an average round trip of 400 feet, compared with a former cost of 60 cents, he decided that one machine would just give him a start. Since then, he has purchased a total of six and has found them the greatest boon to production in the history of the fertilizer business.



In the foreground a larger Payloader, the Model HL, is shown transporting 2,000 lb. of superphosphate to the mill at the Ellis Chemical Company, Jeffersonville, Indiana

When box cars of superphosphate, potash, sulphate of ammonia and conditioning material arrive on the siding at North American, one HA Payloader now unloads a car in 2½ hours traveling a 200 foot round trip to the stock pile. It formerly took 5 men 4 hours to do the same job. Fifty and 60 ton cars of bagged ammonium nitrate are also unloaded with the new machines. This process has been speeded-up by putting one man in the car to pile bags in the Payloader's 10½ cubic feet bucket and one man at the stack in the storage bin. Because of its speed and 78 inch turning radius, which makes it extremely maneu-

verable, the Payloader, acting only as a conveying unit on this job, has saved approximately 40 man hours per car. Bags of tobacco stems are another material unloaded by the HA's and when the empty bags accumulate, they are piled back in the bucket and dumped in an empty car for shipment. It formerly took 12 to 15 men 3 hours to load these tobacco bags, but now it is done with one HA Payloader in one hour—another saving of between 36 to 45 man hours per car.

During the day, the Payloaders are also used to charge the hoppers to the bagging mills with finished fertilizer. Over 30 ton an hour is dumped into the large mill and

Three Hough Payloaders, in use at the North American Chemical Company, Louisville, Kentucky, work as a team to (1) charge the hopper of the elevator leading to the bagging mill; (2) transport superphosphate from stock pile to hopper; and (3) quickly move a ramp from one section of the plant to another

20 ton into the smaller one using four machines. In the days of the "Georgia Buggy" and hand shovel, the 400 tons now dumped into the mill hoppers in 9 hours with four machines, required the work of 18 men.

Batching is done during the night at North American Chemical Company, and once again, by the use of the Payloaders, 90 man hours are saved. Formerly, it took 25 men to mix 250 ton in 10 hours but now, 13 men and 3 HA's accomplish the same job with considerably less effort and in the same amount of time.

In addition to the material handling work, which keeps them all busy, the Payloaders are also used for general clean-up around the aisles of the company, thereby reducing the loss of hard packed spillage which accumulates on the floor.

The Price Chemical Company in Louisville is still another fertilizer manufacturer that has put two Hough Payloaders to work in its shop. The cost of unloading cars of superphosphate, potash, etc., has now been reduced from 40 cents a ton to only 25 cents. Price is now constructing a new and completely modern plant on the south side of Louisville and when the building is finished, all material handling will be mechanized.

Ellis Chemical Company, Jeffersonville, Indiana, has 2 HA's and one HL Payloader handling 1000 ton of fertilizer every 24 hours.

One of the largest fertilizer manufacturing companies in the world has found that Hough Payloaders cut material handling costs so much that they now have 138 HA's operating in their various locations throughout the country.

Payloader Models

The HA Payloader, which is the most widely used model in the fertilizer industry, is built small and compact to operate inside of box cars and along narrow aisles. The operator has full view of the bucket at all times, which assures greater yardage and safer operation. The extremely short turning radius, the overall length of 9 feet 6 inches, width of 51 inches and height of 62 inches affords maximum output even under adverse conditions. The front drive wheels carry the greatest portion of the load which provides better traction both during loading and hauling. Thus being relieved of the load, the rear wheels steer easily and more accurately.

Mounted over the rear wheels out of the dust and dirt, the engine serves to counterbalance the load in the bucket. No skilled operator is required since the Payloader is simple to operate and control. Two speed ranges are provided, either obtainable by a single speed selector lever, permitting the proper speed selection to suit varying conditions. Operating and maintenance costs are extremely low and gasoline consumption runs less than a gallon per hour on the average job.

The Hough organization has recently added a new item, the Payloader Buggy, to its line. This unit is a gasoline-powered, 2-cubic-yard, hydraulically-dumped, general utility factory truck, but does not have the self-loading feature. It is useful in moving materials over longer hauls than are practical with a tractor shovel, or where loading is done from a hopper.

Armour to Build Minnesota Plant

Plans to establish a large fertilizer plant and distribution headquarters in Minnesota for an area covering five states have been announced by John E. Sanford, president of the Armour Fertilizer Works.

Work in the plant to be located at Winona will begin as soon as possible and it is expected to be in operation by next winter, Mr. Sanford said. He pointed out that portions of Minnesota, Wisconsin, North Dakota, South Dakota and Iowa will be serviced from this distribution headquarters.

While Armour's plant foods have been available in that area for many years, shipment has been made from Armour plants in other areas. The new Winona plant will increase supplies in that section, provide faster service and should prove more convenient for farmers and fertilizer dealers.

The plant will have an initial capacity of 50,000 tons per year and will employ up to 100 at the start. It will be built with the idea of expanding facilities and increasing production as warranted.

The plant will be located right on the boat channel of the Mississippi River and it will be served directly by the Chicago, Burlington & Quincy and Chicago Great Western railroads, as well as trucking lines.

"This new plant and sales office is in line with the Armour Fertilizer Works' policy to give farmers the best service possible in filling their needs for commercial plant foods," Mr. Sanford said.

Mr. Sanford said that the use of commercial fertilizers is at an all-time high. He praised the work of state experiment stations in Minnesota and adjoining states in demonstrating the worth of fertilizers for increasing the yield of crops and for building up and maintaining the fertility of the land.

Mr. Sanford pointed out that surveys conducted by authoritative sources show that the average farmer gets back in produce several dollars for every one invested in plant food.

In addition to the plant and distribution headquarters in Winona, Armour will continue to operate plants and sales offices in the following cities:

Atlanta, Albany and Augusta, Ga.; Baltimore, Md.; Birmingham, Ala.; Carteret, N. J.; Chicago Heights, Ill.; Cincinnati, Ohio; Columbia, S. C.; Columbus, Ga.; Dallas, Tex.; East St. Louis, Ill.; Greensboro, N. C.; Houston, Tex.; Jacksonville, Fla.; Jeffersonville, Ind.; Montgomery, Ala.; Nashville, Tenn,; New Orleans, La.; New York, N. Y.; Norfolk, Va.; Presque Isle, Me.; Sandusky, Ohio; Searsport, Me.; Wilmington, N. C.; San Juan, Puerto Rico, and Havana, Cuba.

Early Lease of Cactus Ammonia Plant Expected

Army officials are considering the bids which were received from four companies for the lease of the Cactus Ordnance Works at Etter, Texas, for the production of anhydrous ammonia. The bids were submitted prior to the January 15th deadline and a final decision is expected within a few weeks.

Recently, negotiations have been complicated by pressure from West Coast Congressmen on behalf of a West Coast concern which submitted a bid more than a month after the deadline.

The California delegation to Congress has already sent a letter to Defense Secretary James Forrestal on behalf of West Coast interests, whose normal supply of anhydrous ammonia has been choked off by local gas shortages.

An Army official declared that the Ordnance Department is going full speed ahead in rebuilding the structure which housed the compressors at Cactus. This was destroyed by fire several weeks ago.

The Army, he added, hopes to restore partial production of anhydrous ammonia in 30 days and full production, about 6,000 tons of anhydrous ammonia monthly, in July.

The unassembled second "train" located at Etter is not likely to be disposed of for movement from the present site, officials state. The successful bidder for the Cactus Works will assemble the incompletely equipped second anhydrous ammonia line, after first obtaining some additional equipment, to bring the plant's capacity to about 10,000 tons a month.

Officials point out that the reason for leasing, instead of selling the ordnance plant at this time is to put its full capacity in readiness for a return to munitions production in the event of a national emergency.

In that eventuality, they state, they would not want the Cactus Works dispersed in different areas of the country. In the meantime, however, the department will insist that production of both "trains," when operating, will be required for the Army's fertilizer program for occupied areas.

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Prospective Plantings for 1948 Show Increase

Farmers expect to plant a larger total acreage of principal crops than in any of the past three seasons, if spring weather permits, according to the Crop Reporting Board of the U. S. Department of Agriculture. Up to mid-March, spring had been slow to arrive and winter had held on in much of the country, delaying preparatory work, particularly in the South. But hopefully growers plan to increase the total acreage of feed grains over those they were able to plant last year, to relieve the current feed shortage. Spring plantings of food grains will be relatively large, but not up to 1947 totals. Acreages of oilseeds may be smaller, for though more flax is planned, there will be less soybean and peanut acreage. Potatoes will be planted on a slightly larger acreage, but there will be less acreage in beans, peas, sugarbeets and tobacco.

To permit increases elsewhere, hay meadows and pastures may be reduced and idle land put back into crops. Soil moisture supplies are adequate in practically all areas, except the far Southwest and California. Supplies of fertilizer and new machinery are improved and are not likely to be limiting factors in spring plantings.

The total acreage of principal crops planted or grown in 1948 may exceed 361 million acres, allowing for duplications and for certain crops not yet surveyed. This exceeds by 3.2 million acres or nearly one per cent the 1947 total of almost 358 million acres. With the exception of the wartime peaks in 1943 and 1944, this total is the largest since 1937.

Crop	Acres Planted Average 1937—46	1947	Indicated 1948
		Thousand	
Corn, all	91,696	86,168	86,131
All spring wheat	18,612	19,879	19,789
Durum	2,701	2,952	3,092
Other spring	15,911	16,927	16,697
Oats	42,130	42,501	45,709
Barley	14,632	12,030	12,660
Flaxseed	3,189	4,157	4,401
Rice	1,319	1,687	,666
Sorghums for all purposes	16,936	11,700	12,983
Potatoes	2,89	2,147	2,162
Sweet potatoes	733	618	560
Tobacco	1,644	1,875	1,528
Beans, dry edible	2,008	1,839	1,811
Peas, dry field	460	551	470
Soybeans	10,944	12,894	11,659
Cowpeas	2,710	1,143	1,039
Peanuts	3,254	4,156	3,988
Hay	73,018	75,291	4,215
Sugar beets	854	966	902

Nitrogen Producers Discuss Future Export Allocations

The producers of nitrogen fertilizer materials, meeting in Washington on April 12th, rejected a suggestion of the Office of Industry Co-operation, that they form an industry advisory committee to work out voluntary allocation agreements for the distribution of nitrogen during the coming fertilizer year. The producers felt that distribution during the present year was handled to the satisfaction of the industry and that there is no specific program justifying allocation of these materials.

In a meeting with the Office of Materials Distribution later the same day, the principal topic of discussion concerned the amount of nitrogen to be exported from the United States during the 1948–1949 fiscal year under the program of the International Emergency Food Committee for world nitrogen distribution. It was the consesus of those present that total exports should not be greater than the allotment for the present year, 1947–1948, namely, 61,000 tons of nitrogen and that orders for export shipmets should be equitably divided among all producers. Government representatives seemed to feel that no greater export commitments should or would be made and the industry representatives seemed to be willing to cooperate by furnishing their proportionate share of such allotments.

It was also suggested by some government officials that the export quota include a wider variety of nitrogen materials. At the present time, sulphate of ammonia and ammonium nitrate comprise practically all of our foreign allocation.

The meetings were attended by about 20 members of the nitrogen industry and about the same number of officials from the Departments of Agriculture, Commerce, Interior, State and War.

Industry Organizations Avert Fertilizer Rail Embargo

Prompt action by industry organizations was instrumental in preventing delay of fertilizer shipments by the recent coal strike. On March 23rd, the Interstate Commerce Commission issued an order, requiring all railroads to reduce the mileage of coal-burning freight locomotives by 25 per cent as of March 30th, and issued a list of commodities that should be given preference under the order. This list included (among other items) food, feed, seed, medicines, but did not include fertilizers and fertilizer materials.

Immediately upon the issuance of the order, both the National Fertilizer Association and the American Plant Food Council took active steps to present the case for fertilizers to the commission, as well as to the Department of Agriculture, the Agricultural Committees of Congress and the Office of Defense Transportation.

As a result of their showing the necessity for prompt delivery of fertilizers to farmers during the vital planting period, the Interstate Commerce Commission amended the order to include fertilizers and fertilizer materials.

Both industry organizations are to be congratulated on the prompt and efficient manner in which they averted what might have been a very serious blow to both the fertilizer business and to American agriculture.

Chilean Nitrate Shipments on Schedule

Shipments of Chilean nitrate against the 580,000 metric tons allocated to the United States by the International Emergency Food Council for the current fertilizer year are substantially on schedule, J. F. Doetsch, president of Chilean Nitrate Sales Corporation declared in the March issue of "Victory Farm Forum" published by the Chilean Nitrate Educational Bureau.

"This is a distinct improvement over last year when strikes and shortages of shipping facilities caused serious delays," Mr. Doetsch declared.

"The outlook at the moment, however, is clouded by the fact that we are unable to obtain conveniently our customary supplies of oil for ship bunkers at the Panama Canal and at most United States ports.

"Instead, it is necessary, after unloading at United States ports, to divert most of the ships to Curacao in the Dutch West Indies where sufficient oil for a complete round trip voyage is presently available.

"This diversion adds several days to the ship's running time and reduces the quantity of nitrate that can be carried each voyage.

"We are exerting every effort to avoid serious delays as the result of the present emergency in fuel oil supplies and we are hopeful that we can maintain delivery schedules for the remainder of the season."

According to a U. S. Department of Commerce report, nitrate producers in Chile hope to increase production by 30 % during 1948.

Army Ordnance Experts Report on Texas City Explosion

The explosion of fertilizer grade ammonium nitrate in the cargo ships *Grandchamp* and *High Flyer* in the Texas City, Texas, disaster of April, 1947, was caused by a preliminary explosion of the gases produced in the fire which preceded the major explosion, according to a hypothesis explained in a report now on sale by the Office of Technical Services, Department of Commerce.

The report describes an investigation of the possible causes of the disaster carried out by P. F. Macy, T. D. Dudderar, E. F. Reese, and L. H. Eriksen, chemists of the U. S. Army Ordnance Department at Picatinny Arsenal, New Jersey. The fertilizer grade ammonium nitrate on board the ships was manufactured in Army arsenals.

The ammonium nitrate cargo on the *Grandchamp* and *High Flyer* consisted of nitrate nodules coated with 0.75 per cent wax and 3.5 per cent clay. It was packed in 100-pound moisture-proofed, six-ply paper bags and stacked on wooden supports in the hold. Witnesses reported that the stowed ammonium nitrate had burned for over an hour before the explosion.

The investigators visualize the mechanism of the explosion approximately as follows:

The paper bagging or wooden supports were accidentally ignited. This was followed by slow combustion in which the ammonium nitrate rather than air supplied the necessary oxygen for the fire. The heat melted additional ammonium nitrate causing the nitrate to react with the coating wax, paper bagging, and wood to produce a gaseous mixture of carbon monoxide, nitrous oxide, and heavy acid gases. The mixture, being heavier than air, displaced the air in the hold of the ship. After the hatch was battened down, the gas pressure in the hold increased (as indicated by the testimony of witnesses). When the closely confined gaseous mixture reached its lower limit of concentration for ignition (or was heated to its ignition point), it exploded. This preliminary or primary explosion was sufficient to initiate the explosion of the molten ammonium nitrate and probably part of the hot but still solid ammonium nitrate.

This analysis of the mechanism of the explosion is based on experiments carried out at Picatinny Arsenal which show that the combustion of nitrate and paper or wood can produce gaseous products which will explode. Experimental efforts to explode ammonium nitrate mixed with bagging paper in a bomb container were successful when the air in the bomb was replaced with mixtures of carbon monoxide and nitrate oxide, the report states.

Ammonium nitrate has long been known to undergo explosion when detonated by another high explosive, the report explains. However, the investigators know of no instance in which it has exploded as a result of fire or heat alone. Presumably a primary explosion would be essential. This line of reasoning led the investigators to their hypothesis of the Texas City explosion.

In connection with the origin of the fire, the investigators believe that spontaneous ignition of the ammonium nitrate is highly improbable because of the high temperatures required for ignition (302 degrees F.). Nor does it appear that the possible presence of contaminants in the hold (iron, wood, sawdust, etc.) caused the fire, although this possibility is not precluded. The investigators offer no conclusions concerning the origin of the fire other than that it was "accidental ignition of the bagging or wooden dunnage."

While their hypothesis of the explosion "can never be proved," the investigators state, "it seems the most reasonable hypothesis of the mechanism of the explosion

(Continued on page 30)

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FERTILIZER MATERIALS MARKET

NEW YORK

Sulphate of Ammonia Producers Affected by Coal Strike. Price Increases on Ammonium Nitrate Reported. Demand for Nitrogenous Slackens. Organics Market Slow. Better Demand for Superphosphate. Potash Imports Help Lighten Situation

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, April 12, 1948.

Sulphate of Ammonia

Producers were beginning to feel the pinch of the coal strike and had to re-arrange their shipping schedules in some cases to conform to cuts in production. It was generally conceded if the strike continued it would affect the production at all main producing plants. Manufacturers were urgently seeking supplies in the open market, but practically no material was to be had.

Nitrate of Soda

While boats from Chile continue to arrive at various Atlantic ports, the demand is still heavier than the importers' supply and buyers are unable to fill their entire requirements, although material is being allocated as evenly as possible.

Nitrogen Solutions

It was reported that certain midwestern producers had raised their prices. Demand was heavy from all sections with most producers trying to stick to their original shipping schedules.

Ammonium Nitrate

Prices were raised on this material by two midwestern suppliers but no new sales were noted. The demand is urgent from all sections, with some producers far behind on shipments.

Organics

Trading in organic fertilizer materials was slow as manufacturers preferred to use up stock on hand rather than take on new commitments. There was a slightly firmer tendency in vegetable meals, with soybean meal quoted at $75.00 per ton, f.o.b. Decatur, and cottonseed meal $85.00 per ton, f.o.b. Memphis. Linseed meal weakened on account of the small demand from the feed trade and some sales were made as low as $64.00 per ton in bulk, f.o.b. Minneapolis. While tankage and blood were quoted at $7.00 ($8.51 per unit N), f.o.b. shipping points, it was thought with a firm bid material might be purchased at $6.50 ($7.90 per unit N).

Fish Meal

The demand from both the fertilizer and feed trade was poor and there were numerous re-sale lots on the market with some material reported sold at $2.15 per unit of protein. With the approach of the new fishing season, most buyers preferred to await developments.

Castor Pomace

Some re-sale lots were reported offered at prices under the producers price of $40 per ton. Inquiry was slow. Due to the lateness of the season in most sections, buyers were slow to give shipping instructions.

Nitrogenous Material

One of the leading producers, it was reported, reduced the price of their material to $4.20 per unit of ammonia ($5.10 per unit N) from $5.00 ($6.08 per unit N), effective April 1st. Other producers were expected to follow this price cut. The demand for this material has been poor recently from most sections.

Superphosphate

The demand for this material has picked up considerably in the last two weeks and some large producers are unable to promise any nearby shipment on new orders. Triple superphosphate was in good demand but producers were unable to accept any new orders.

Potash

Several lots of imported material arrived recently which did a lot to help the situation. The demand was still heavy from all sections, however, and the small amount of potash offered by the producers as spot sales during April were quickly snapped up by the buyers.

CHARLESTON

Chemical Nitrogen Market Still Tight, with Lower Prices on Nitrogenous Tankage. Superphosphate Market Easier. Potash on Schedule

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, April 12, 1948.

The nitrogenous market is relatively weak, and solid nitrogen continues extremely scarce, with prospects that the situation will grow tighter in the next month or two. Superphosphate is slightly easier. Potash shipments are on schedule.

Organics.—There has been some sale recently of domestic nitrogenous tankage at prices considerably lower than this time last year, for shipment during the summer and early fall. South American organics continue entirely too high for domestic fertilizer buyers.

Castor Pomace.—Some producers are still asking around $40.00 per ton f.o.b. production points in the East, but few sales are reported.

Potash.—Shipments against contracts are on schedule, and the spot market now prevails, with no discounts allowed. Demand continues fairly active, and whatever supplies are offered by the original producers are being taken up quickly.

Nitrate of Soda—Demand continues excessive, with no changes noted in the prices of either the domestic or the imported.

Sulphate of Ammonia.—The coal strike threatens to reduce supplies, and demand has increased accordingly.

Dried Ground Blood.—Chicago market is around $7.00 per unit of ammonia ($8.51 per unit N), in bulk, with the New York market in the doldrums at the same figure. Fertilizer buyers are not interested at such figures, and the feed market affords little support.

Tankage.—New York and Chicago markets are nominally $7.00 per unit of ammonia ($8.51 per unit N), with little interest shown by either feed or fertilizer buyers.

Superphosphate.—Demand has eased slightly as the supply situation has improved, and because of shortage of potash and nitrogen, buyers lack complete ingredients to manufacture mixed goods.

Phosphate Rock.—No easement is noted in the demand, and the market continues tight.

PHILADELPHIA

Abnormal Demand for Mixed Fertilizers Developing. Sulphate of Ammonia Production Declining. Organic Feed Market Slackens

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, April 12, 1948.

The demand continues for chemical nitrogen, and there seems to be an abnormal demand in some sections for mixed fertilizers. Some mixers are still very much in need of potash. The market for organics is much easier.

Sulphate of Ammonia.—Demand continues far ahead of production, and due to the serious coal situation the production is rapidly declining. There is ready outlet for resale material at $70.00 per ton, and over.

Nitrate of Soda.—Supply is decidedly short of demand and new purchases for prompt shipment are impossible. Any movement now is against earlier contracts.

Ammonium Nitrate.—There is now slightly better distribution, but the demand is still very much in excess of supply. The producers' price is reported to have advanced about $4.00 per ton. However, resale material, where obtainable, commands a high premium.

Castor Pomace.—This material now seems

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to be in plentiful supply at $40.00 per ton, f.o.b. producing plants. Quotations of $35.00 have been reported unofficially.

Blood, Tankage, Bone.—Blood is reported sold at $7.50 per unit of ammonia ($9.12 per unit N), and tankage as low as $7.00 ($8.51 per unit N). The feeding demand is very slack for these materials and they are likely to soon again find favor with the fertilizer mixer. Raw bone meal is scarce, but steamed bone remains available at $50.00 to $55.00 per ton.

Fish Scrap.—Scrap has been quoted nominally at $135.00 to $140.00 per ton. No recent offerings of menhaden meal have been reported, but some imported meal, 56 per cent protein, has been offered at $140.00 per ton.

Phosphate Rock.—The buying situation is still uneasy, with production short of demand.

Superphosphate.—Supply position is somewhat easier with no important price changes reported.

Potash.—Domestic production seems to have kept pace with contract requirements, and improved traffic conditions have kept deliveries moving satisfactorily. Supply does not, however, satisfy present demand.

CHICAGO

Interest in Organics at Low Ebb in Spite of Price Reductions. Adequate Supplies Available

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, April 12, 1948.

Animal ammoniates continue in a state of lethargy. Buying interest in finished as well as unground materials is very indifferent and, in spite of the limited slaughter due to the packinghouse strike, available supplies are still abundant. Price reductions are indicated in some instances in an effort to stimulate trading, but buyers show no inclination to acquire additional supplies in the absence of any spirited demand in consuming channels.

Dried blood and wet rendered tankage are nominally unchanged at $7.00 per unit of ammonia ($8.51 per unit N) with very limited trading on this basis, and dry rendered tankage is somewhat easy at $1.50 per unit of protein with indications that any pressure to sell would force the price downward. Steam bone meal is nominal at $60.00 per ton with a very light movement reported.

Some sales of hoof meal were reported at $7.00 per unit of ammonia ($8.51 per unit N) but not much of this material is offered.

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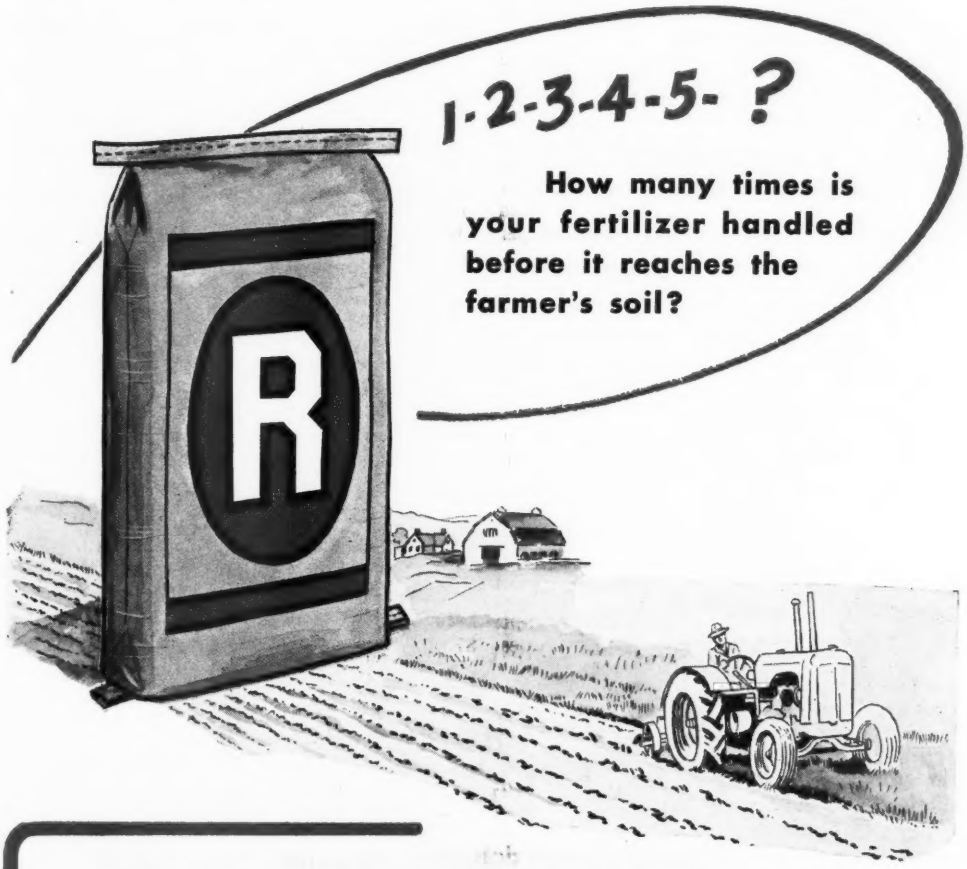

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World Nitrogen Deficit May Increase

The world is facing an even greater deficit in fertilizer nitrogen during the year beginning July 1, 1948 than it has experienced during the present fertilizer year which ends on June 30th. This is the opinion of the International Emergency Food Committee, as contained in a recent statement to the press. Their conclusion is based, not on a decrease in production, but rather on greatly increased demand from every food-producing country.

From a questionnaire sent to 66 nations, the committee estimates that the 1947–48 year will show a production of 2,394,000 metric tons of nitrogen as against a demand of 2,985,000 tons. In 1948–49, thirty-one nitrogen-producing countries expect to increase production tc 2,667,000 tons, but demand is estimated at 3,263,000 tons if food expansion plans are fully realized and currency is available. Most of the increase in production, moreover, is planned by countries with no exportable surplus.

Dupont Enlarges Urea Field Staff

The DuPont Company has announced that the field staff of the Nitrogen Products Section of the Ammonia Department has been expanded to cover all the United States in the promotion of the use of urea products in the fertilizer and feed industries.

For the first time there will be a staff man on the Pacific Coast. M. N. Crady, who for 12 years covered the South Central states, will have headquarters in San Francisco.

Two men have been added to the field force. They are John Spicer, who was transferred from the Standard Products Section, and R. E. Burke, who has been doing special studies for the Nitrogen Products Section. Mr. Spicer will have headquarters in Goldsboro, N. C., and will cover the Middle Atlantic states. Mr. Burke will succed Mr. Crady in the South Central states, with headquarters in Jackson, Mississippi.

F. M. Jornlin, who has been an agricultural adviser to the United States Army of Occupation in Japan for a year, returns to Minneapolis and will cover the western half of the North Central states. O. F. Jensen will cover the eastern portion of this area from headquarters in Maple City, Michigan.

The Northeastern states will be covered by N. A. Hite, with headquarters in Merchantville, New Jersey, and Ward Sachs will have headquarters in Orlando, Florida, covering the South Atlantic states.

Farm Income at Record Level in 1947

Cash receipts from farm marketings set a new high during 1947, according to figures released by the Bureau of Agricultural Economics. Income from the sale of crops, livestock and products totaled $30,175,000,000, exclusive of Government payments. This is 23 per cent above 1946 figures and is higher than any other year on record.

Receipts from livestock and products accounted for 17 billion dollars or 57 per cent; receipts from crops represented the remaining 43 per cent.

By states, percentage changes for 1947 as compared with 1946 ranged from a 14 per cent decrease for Florida to a 56 per cent increase for Mississippi. Four of the States, Florida, North Carolina, South Carolina and Delaware, reported decreases; increases were recorded for the remaining 44 States, and in 24 of these States the increase amounted to over 20 per cent. Generally, the largest increases were in the west central States.

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Hearings on National Fertilizer Laboratory Bill

The House Committee on Agriculture has begun hearings on the Dirksen Bill (H. R. 4752) which would establish a national fertilizer and soil fertility laboratory. The cost of building and equipping this laboratory and maintaining it during the 1949 fiscal year would be met by transferring $1,000,000 from other Department of Agriculture Funds.

According to the bill, the laboratory will "conduct researches into problems relating to fertilizer and soil fertility, for the purpose of the improvement and maintenance of the productivity of agricultural soils."

February Sulphate of Ammonia

The production of by-product sulphate of ammonia continued at the high level established during January, according to the U. S. Bureau of Mines. Total output was 69,520 tons, which includes 2,104 tons produced from purchased synthetic ammonia, the balance being made from coke-oven ammonia. Shipments about equaled production and stocks on hand at producing plants remained at about 30,000 tons, less than two weeks' output. The increase in production for the first two months of the year is 11 per cent above the period of 1947.

	Sulphate of Ammonia Tons	Ammonia Liquor Tons NH_3
Production		
February, 1948	69,520	1,990
January, 1948	74,132	2,094
February, 1947	61,288	1,986
Jan.–Feb., 1948	143,652	4,084
Jan.–Feb., 1947	129,343	4,150
Shipments		
February, 1948	68,477	1,988
January, 1948	70,961	1,782
February, 1947	56,401	1,725
Stocks on Hand		
Feb. 29, 1948	31,988	926
Jan. 31, 1948	31,538	1,077
Feb. 28, 1947	40,080	817

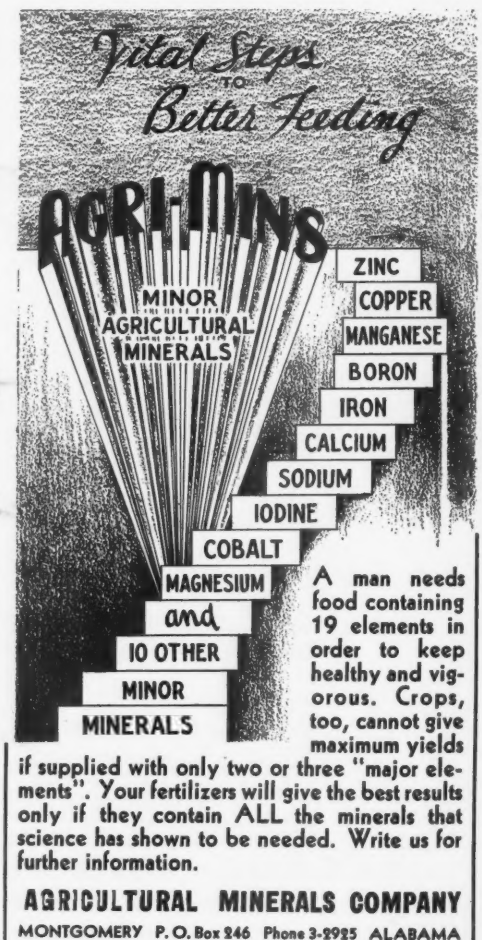
Nichols Elected Mathieson Chemical President

Thomas S. Nichols, formerly vice-president of Prior Chemical Company, has been elected president and chief executive of Mathieson Chemical Corporation (formerly Mathieson Alkali Works). George W. Dolan, former president, was elected chairman of the board.

Mr. Nichols started his business career with the DuPont Company and joined the Prior organization in 1937. At the beginning of the War he joined the government chemicals bureau, subsequently a part of the War Production Board. Loaned to the State Department by WPB, he became a permanent member of the Harriman Mission to London.

Returning to this country, he was made chairman of the sulphuric acid operating committee dealing with TNT and other war products. He acted in a consulting and administrative capacity in the government's work with inorganic chemicals, including alkalies.

In 1945 Mr. Nichols returned to Europe as a member of the Technical-Industrial Disarmament Committee on chemicals. Following the war he returned to his Prior Chemical post.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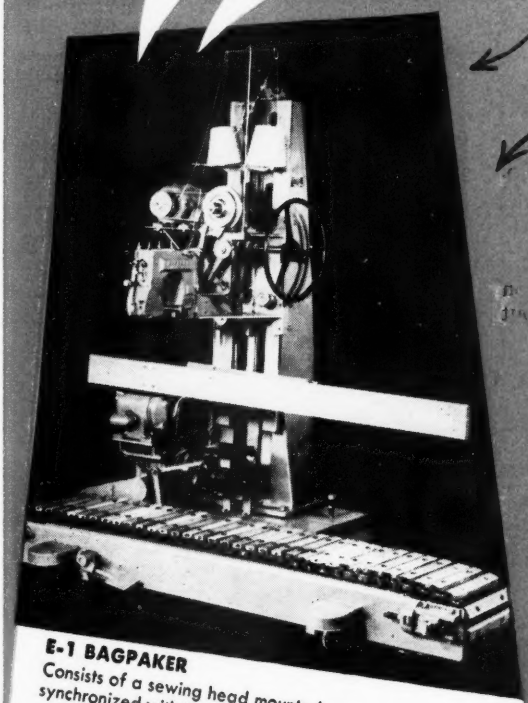

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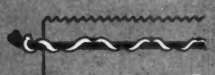

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Tests of Radioactive Fertilizer Materials Show Possibilities

The results of a series of tests on the effect of radioactive fertilizer materials on the productivity of certain vegetable crops has been described by Carl B. French, of X-Ray and Radium Industries, Toronto, Canada, in the March issue of *Canadian Chemistry and Process Industries.*

Plots were planted with carrots, tomatoes, potatoes, cabbages and string beans. Soil treatment included: no fertilizer or manure; commercial fertilizer only as indicated by soil test; well rotted barn-yard manure; commercial fertilizer plus manure. To each of the above series of plots was added radioactive material as follows: none; 1 unit; 4 units; 10 units. The article unfortunately does not state what the radioactive material consisted of, or what standard was adopted for the "unit" as applied. It would also have added to the value of the article if the analysis of the fertilizer had been given, also the rate of application per acre of the fertilizer and manure.

The results of the tests are not given for each individual vegetable tested but the aggregate pounds of crop harvested on each plot are used to allow a comparison to be made. The results are summarized as follows:

Tests of Radioactive Material
Average Pounds of Crop Harvested per Plot

Soil Treatment	Units of Radioactive Material Added 0	1	4	10
No Fertilizer.....	24.8	24.1	27.5	29.5
Commercial Fertilizer.	66.6	69.1	127.9	86.1
Manure.....	141.1	151.7	116.4	136.1
Commercial Fertilizer plus Manure.....	180.6	212.3	157.9	192.2

From the above results, it is evident that radioactive materials have a marked influence on the increase of the yields. With no fertilizer, maximum doses give the best results. With commercial fertilizer only, moderate doses seem superior. With manure or a manure-fertilizer combination, small doses appear to be all that are needed.

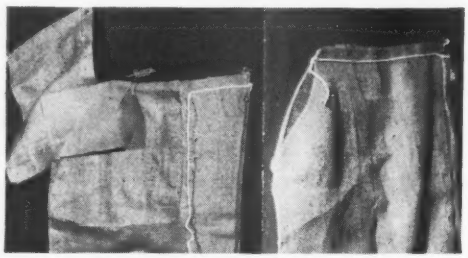
The author suggests that future work be undertaken as follows:

1. Experiments should be carried out with regard to the method of distribution of the fertilizer and the radioactive material.
2. Further exploration to determine the optimum dose for each crop.
3. Effect on pot plants and greenhouse seedlings for transplanting.
4. Effect on blooming.
5. Germination of dormant seeds.
6. Effect on root and bulb crops.
7. Application to specialized crops such as tobacco, tomatoes and cotton.

Bemis Develops Paper Sleeve Valve in Burlap Bag

The development of a paper sleeve valve in Bemis Rip-Cord closed burlap bags has added to the convenience and economy of the packing operation, and increases the re-use value of these bags.

The valve burlap bags may be used on the same filling machines as valve paper bags, eliminating the need for two types of filling and closing equipment. Burlap bags fill more rapidly on the packer than paper bags, because their greater porosity permits rapid escape of air.



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On the farm, the Bemis Rip-Cord Closure permits fast, easy opening without damage to the bag. A quick jerk on either end of the cord gives a full or partial opening as desired. After being emptied the undamaged bag becomes a regular open mouth burlap bag which can be used as a potato pick-up sack or for any of the other normal uses of second-hand bags. Although designed and

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Fertilizer plants all over the country—large and small—state their needs and we meet them. Large stocks of seasoned materials and ample modern production facilities enable us to make prompt shipments.
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introduced as fertilizer bags, indications are that these valve burlaps will find application in the packaging of many other free-flowing commodities. The paper sleeve, which is the distinguishing feature of these bags, is made of smooth Kraft paper and is bonded to the burlap with thermoplastic. This paper insert is placed in the mouth of the turned bag and passed through a special heat-sealing machine where heat and pressure fasten it securly to the fabric. The insert and bag are then folded to form the sleeve valve. The final operation consists of sewing the top of the bag closed with the Bemis Rip-Cord Closure.

This bag has been in the experimental stages for several years and now proves to be entirely satisfactory.

Earhart Joins C.S.C. Agricultural Division

Bill L. Earhart has joined Commercial Solvents Corporation as salesman for the Agricultural Division. He will cover the eastern seaboard, making his headquarters at CSC's Philadelphia Office, 1617 Pennsylvania Boulevard.

Mr. Earhart attended Pennsylvania State College where he majored in Dairy Husbandry. During the war, he was with the Chemical Warfare Service in the South Pacific.

New Jersey Tonnage Declines in 1947

Sales of fertilizers in New Jersey during 1947 amounted to 242,789 tons, according to figures released by Stacy B. Randle, State Chemist. This is a drop of 6.6 per cent from 1946 sales of 259,799 tons. Sales during the first half of 1947 totaled 189,756 tons and fall sales totaled 53,033.

Of the total tonnage, 219,049 tons were mixed fertilizers and 23,740 tons were individual materials. It is interesting to note that all but about 12,000 tons of the mixed fertilizer were of the 11 grades approved and recommended by the Agricultural Experiment station. Of the mixed fertilizers, there was no change in the five most popular grades, which were: 5–10–10, 74,635 tons; 4–12–8, 56,067 tons; 5–10–5, 35,053 tons; 3–12–6, 19,796 tons; 3–9–12, 9,321 tons. The leading materials were superphosphate, 10,977 tons and nitrate of soda, 3,789 tons.

Agricultural lime applied during the year amounted to 216,192 tons, compared with 196,088 tons in 1946.

Private Companies to Continue Radioactive Fertilizer Research

The research program in the direct stimulation of agricultural crops by radioactivity, announced by the Atomic Energy Commission and the Department of Agriculture, will continue research launched several years ago by the Canadian Radium and Uranium Corporation and the International Rare Metals Refinery, Inc., both of New York.

Sixty-three experimental plantings on a variety of crops have been sponsored by these corporations since 1944 at agricultural stations and experimental farms all over the United States. An analysis of the results of these test programs indicates that minute quantities of radioactive materials applied to the soil affect favorably the yield of crops, the size and quality of the fruit and vegetables, and the rate of maturity. In one case an increased yield of 92 per cent has been reported. The most significant results have been with vegetables, especially peas, cucumbers, tomatoes and sweet potatoes.

The purpose of the present program is to confirm the results of the previous experiments both under laboratory conditions and in actual field trials. Parallel to the government programs, the companies will continue to carry on field tests and research with the cooperation of commercial fertilizer companies and planters. The emphasis of the present projects is to determine the optimum dosage and the conditions under which the best results will be obtained. The dosage indicated for one acre is approximately one-ten thousandth of an ounce of radioactive material in a neutral carrier. The materials which will be used in these experiments are non-fissionable radioactive compounds prepared by the companies.

Boris Pregel, president of Canadian Radium and Uranium Corporation and Inter-

AN APPLE A DAY...

Gnarled little runt, or gorgeous ruddy giant—what a vast difference there is in apples! The finest represent high scientific care and attention to every factor leading to perfection. Especially, the correct and adequate use of modern fertilizers. Many of these are compounded with potash—often with Sunshine State Potash, a product of New Mexico, and an outstanding soil nutrient that protects crops against plant diseases and droughts, and provides greater soil fertility.

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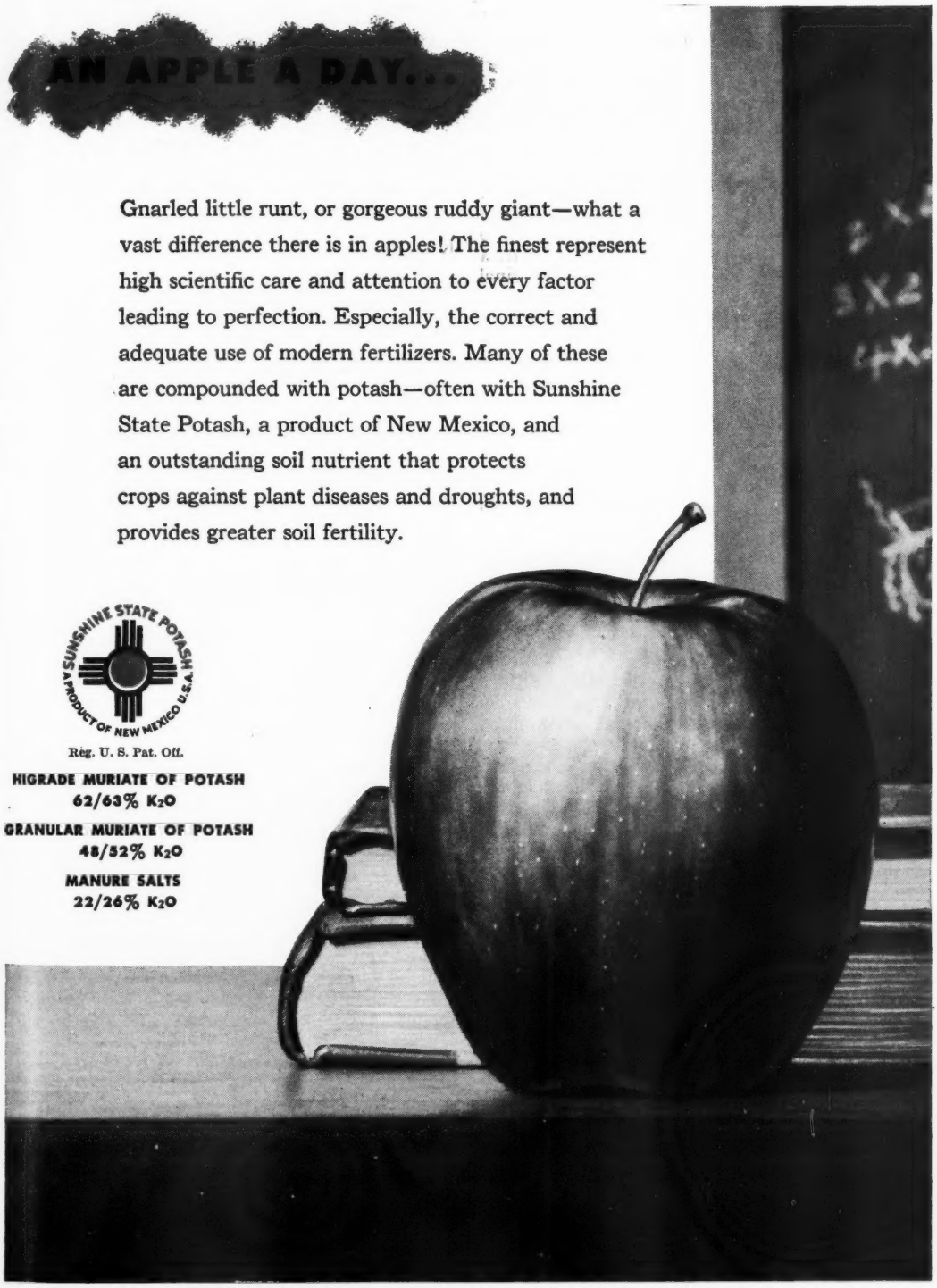

UNITED STATES POTASH COMPANY, Incorporated • 30 Rockefeller Plaza, New York 20, N. Y.

national Rare Metals Refinery, Inc., and his brother Alexander Pregel, vice-president of both companies, began their work on the application of radioactivity to agriculture in France long before the war. The Pregel brothers were both active in the refining of radium and the development of medical and industrial applications for radioactive products. Their work in the agricultural field during the '30's led to the development of a product which had been tested and prepared for commercial distribution just before the Germans invaded France. The Pregels escaped from Paris the day the Germans entered and made their way to the United States where they worked on problems connected with the Manhattan Project. The Smyth Report on the history of the atom bomb credits the Canadian Radium and Uranium Corporation with furnishing the materials for the earliest experiments on nuclear fission at Columbia University, experiments which led to the building of the first chain reaction pile.

Schrock Equips Sales Cars with Radiotelephones

The Schrock Fertilizer Service of Congerville, Illinois, one of the largest distributors of natural rock phosphate in the country, recently installed mobile radiotelephones in two company-owned automobiles, making it possible for field and company personnel to be in constant, direct two-way communication with the home office at Congerville, located half-way between Peoria and Bloomington. It is believed this is the first agricultural firm in the United States to make installation of this modern two-way communication device.

Each automobile contains a compact radio transmitter and receiver, antenna, and hand telephone. Mounted conveniently on the vehicle dashboard, the hand telephone is ready for use just like any other manually operated telephone instrument. A control switch is turned on at the start and end of a day's operation to supply or shut off power. On each receiver panel are visual and audible signals, which operate only when the particular vehicle is called.

For example, if one of the Schrock men is out in the field talking to a farmer or traveling down the highway and a question arises that requires assistance from the office, the occupant of the car merely picks up the hand telephone, waits until the mobile operator contacts him and then gives her the office number or any other number he desires. She in turn connects him with the party desired and the procedure is then similar to that on an ordinary telephone.

Shrock Field Man Keeps in Touch with Home Office

If some member of the Schrock organization wants to talk to an occupant of the mobile radiotelephone equipped car, he merely picks up his telephone and asks for long distance, and then asks to be connected with "mobile service operator." This operator signals the driver over the proper radio channel by dialing the vehicle's number. Seeing and hearing the signals, both by light and by an ordinary telephone ring, the driver answers and carries on a normal convdrsation. If the driver of the car happens to be away from the car, the automobile horn will sound and an amber visual signal remains lighted so that he will see it when he returns.

According to officials of the Schrock organization, the units have been "life savers." During the recent ice storm the units were the only outside communication for a period of better than two weeks. With them business was carried on "as usual."

Fertilizer Machinery *AND* Acidulating Equipment

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the number of pounds of raw material for a desired per cent. of plant food in a ton of mixed goods—or find what per cent. of a certain plant food in a ton of fertilizer produced by a specific quantity of raw materials.

No mathematical calculations are necessary. You can find the figures in a few seconds with the aid of

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A Great Convenience for the Manufacturer of High Analysis Goods

To make clearer its use, answers to such problems as the following can be quickly obtained:

How much sulphate of ammonia, containing 20 per cent. of nitrogen, would be needed to give 4½ per cent. nitrogen in the finished product?

Seven hundred and fifty pounds of tankage, containing 8 per cent. phosphoric acid are being used in a mixture. What per cent. of phosphoric acid will this supply in the finished goods?

Should the Adams' Formula Rule become soiled from handling, it may be readily cleaned with a damp cloth.

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Special quotations on twelve or more.

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February Superphosphate Production

Production of superphosphates during February totaled 883,852 tons (figured on the basis of 18 per cent A. P. A.) according to the U. S. Bureau of Census. While this is a drop of 5.4 per cent from January, the daily production is approximately the same. February production showed an increase of 7.2 per cent over February, 1947. The drop in tonnage was all in the normal (18 per cent) grade, as concentrated superphosphate increased 2,500 tons over January, and base goods by almost 2,000 tons.

Shipments of all grades were slightly higher than production, with the result that stocks on hand at the end of the month had dropped to 897,027 tons of normal, 68,096 tons of concentrated, and 11,862 tons of base goods.

	Normal 18% A. P. A.	Concentrated 45% A. P. A.	Base Goods 18% A. P. A.
Production	Tons	Tons	Tons
February, 1948...	785,608	36,480	7,044
January, 1948....	836,350	33,980	5,023
February, 1947...	747,730	28,514	5,563
Shipments and used in reporting plants			
February, 1948...	822,457	38,160	8,048
January, 1948....	793,304	30,338	10,391
February, 1947...	821,964	27,644	9,717
Stocks on hand			
Feb. 29, 1948....	897,027	68,096	11,862
Jan. 31, 1948.....	918,506	69,776	12,867
Feb. 28, 1947....	613,797	52,579	5,305

Scotland to Study Fish Improvement by Fertilizer Use

As reported in the Fertilizer and Feeding Stuffs Journal, of London, a committee headed by Prof. C. M. Yonge, of Glasgow University, has been set up to study the subject of increasing the growth of fish in the fresh-water lakes of Scotland by the application of fertilizers. During the years 1942–46, a similar investigation was made of the possibilities of this method in improving the supply of food for salt water fish in the numerous bays and lochs on the Scottish west coast.

In the salt water experiments, the addition of nitrogen and phosphorus only was sufficient to maintain plankton production after its natural spring surge. The potassium salts in sea water gave an adequate supply of this element. In the fresh-water experiments, potash will have to be included in the fertilizer to be used.

Similar studies in the ponds and lakes of the United States and Canada have shown very profitable results from the use of fertilizer for this purpose.

January Exports and Imports Increase

Foreign trade in fertilizers and fertilizer materials during January showed an increase of about 100 per cent over January, 1947, according to the figures of the U. S. Department of Commerce. Exports totaled 209,171 tons, as compared with 100,216 tons in January, 1947. Imports amounted to 121,485 tons, as against 65,920 tons in January, 1947.

On the export side, phosphate rock accounted for 86,181 tons, an increase of 32,000 tons over January, 1947. The other leading export items were sulphate of ammonia, 17,567 tons; other nitrogenous chemicals (principally ammonium nitrate), 69,836 tons; superphosphate, normal and concentrated, 16,009 tons; potash salts, 8,001 tons; fertilizer mixtures, 9,996 tons.

Imports of nitrate of soda increased from 11,233 tons in January, 1947, to 68,081 tons. Other imports were sulphate of ammonia, 8,407 tons; ammonium nitrate mixtures, 7,790 tons; cyanamid, 10,233 tons; ammonium phosphates 7,467 tons; bone phosphates 6,163 tons; potash salts, 2,479 tons.

For the July–January period, exports totaled 1,021,859 tons compared with 743,761 tons for the same period of 1946–47. Imports showed a proportional increase, from 530,479 tons to 735,467 tons.

REPORT ON TEXAS CITY EXPLOSION

(Continued from page 14)

that is supported by existing data. On the basis of this hypothesis it is believed that in case of accidental ignition of bagged fertilizer grade ammonium nitrate in warehouses or ships it is important to avoid confinement of the gases produced."

The report describes the tests carried out at Picatinny Arsenal in detail and includes many supporting tables of data. Photographs of the results of the tests conducted and a review of the literature on the explosive properties of ammonium nitrate are also contained in the report.

Photostat copies of the 46-page report (PB-86049, *Investigation of sensitivity of fertilizer grade ammonium nitrate to explosion, July 1947*) sell for $4. Microfilm copies are $2.

Orders for the report should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order payable to the Treasurer of the United States.

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Virginia-Carolina Chemical Corp., Richmond, Va.

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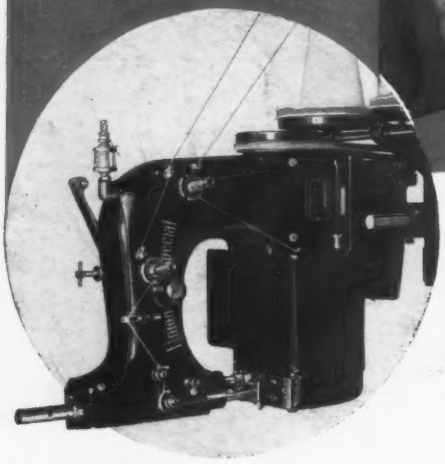

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